CLAIMS

What is claimed is:

1. An improved packaging for establishing optimum atmospheric conditions for respiring produce, comprising:
a polymeric material;
a set of microperforations on said polymeric material, wherein said set of microperforations are calculated to control said optimum atmospheric conditions within specified O_2 and CO_2 concentrations for said respiring produce, and wherein said set of microperforations are placed in a registered target area on said polymeric material.

2. The improved packaging material according to claim 1, wherein said polymeric material is selected from the group consisting of polyethylene, polypropylene, polyester, nylon, polystyrene, styrene butadiene, cellophane, and polyvinyl chloride, in monolayers, coextrusions, and laminates.

3. The improved packaging material according to claim 1, wherein said polymeric material is heat-sealable.

4. The improved packaging material according to claim 1, wherein said polymeric material has a thickness in the range of 0.4 to 8 mil.

5. The improved packaging material according to claim 1, wherein said polymeric material provides a total O_2 Flux ranging from 150 cc/day-atm to 5,000,000 cc/day-atm.

6. The improved packaging material according to claim 1, wherein said polymeric material provides a total O_2 Flux ranging from 200 cc/day-atm to 1,500,000 cc/day-atm.

7. The improved packaging material according to claim 1, wherein said polymeric material forms a bag.

8. The improved packaging material according to claim 1, wherein said polymeric material is a heat sealable lidding film.

9. The improved packaging material according to claim 1, wherein said polymeric material is formed into a semi-rigid container with a thickness greater than 8 mil.

10. The improved packaging material according to claim 1, wherein said registered target area is a small identifiable area in an upper quarter of said package.

11. The improved packaging material according to claim 1, wherein said registered target area is a small identifiable area in an upper third of said package.

12. The improved packaging material according to claim 1, wherein said registered target area is located in an area that prevents occlusion of the microperforations by product or other packages.

13. The improved packaging material according to claim 1, wherein each of said microperforations has an average diameter between 110 and 400 microns, preferably 120-160 microns.

14. The improved packaging material according to claim 1, wherein said polymeric material has a CO_2 transmission rate that is 2.5 to 5.0 times greater than the O_2 transmission rate, most preferably 3.4 to 4.0 times greater.

15. A produce packaging material produced by the process of:

a) selecting an appropriate polymeric base material for specified CO_2/O_2 transmission rates ;

b) calculating an optimal number/size of microperforations for said base material;

c) locating a target area on said base material;

d) positioning a laser over said target area; and

e) drilling said microperforations in said target area with said laser.

16. The improved packaging material according to claim 15, wherein said laser is a CO_2 laser.

17. The improved packaging material according to claim 15, wherein said optimal number/size of microperforations is based on produce-specific O_2 and CO_2 transmission rate requirements, produce weight, and storage temperature

18. The improved packaging material according to claim 15, wherein said step of locating a target area uses a sensor.

19. The improved packaging material according to claim 17, wherein said sensor is selected from the group comprising a through-beam photoelectric sensor and a photoelectric proximity sensor.

20. The improved packaging material according to claim 15, wherein said step of calculating said required O_2 flux by the microperforations is based on the formula:

$$\mathrm{Flux}_{O2\text{-}MP\ (cc/day\text{-}atm)} = \mathrm{Flux}_{O2\text{-}Total} - \mathrm{Flux}_{O2\text{-}film}$$

Where:

$$\mathrm{Flux}_{O2\text{-}film}\ (cc/day\text{-}atm) = \mathrm{OTR}_{base\text{-}film}\ (cc/m^2\text{-}day\text{-}atm) \times A_S\ (m^2)$$

$$\mathrm{Flux}_{O2\text{-}total} = \mathrm{OTR}_T\ cc/m^2\text{-}day\text{-}atm \times A_s\ (m^2)$$

And:

$$\mathrm{OTR}_T = [(M \times RR) / (A_S\, P\, (0.21 - \mathrm{IntO}_2))] \times 24\ hrs/day$$

where,

OTR_T	=	total OTR required for the package in cc O_2 / m^2-day-atm
M	=	mass of produce (kg)
RR	=	respiration rate (cc O_2/kg/hr) @ the expected storage temperature
A_S	=	breathable surface area of the package (m^2)
P	=	atmospheric pressure (atm), assumed to be 1

Int O_2 = desired O_2 atmosphere inside the package stated as a volume fraction (i.e., if the desired O_2 is 8%, the volume fraction is 0.08);

and the value 0.21 represents the volume fraction of O_2 in ambient air.